
2023 RESEARCH SYMPOSIUM POSTER SESSION

WEDNESDAY, MARCH 29TH, 2023

POSTER SESSION AGENDA

WELCOME / DOUGLAS E. WOOD, MD, FACS, FRCSED, THE HENRY N. HARKINS PROFESSOR AND CHAIR

INTRODUCTION / DAVID R. FLUM, MD, MPH, VICE CHAIR FOR RESEARCH, SURGERY, PROFESSOR, SURGERY

Manal Jmaileh, MD, MPH – TL1 Translational Research Training Program Research Fellow <i>(presenting on behalf of Aldina Mesic, MPH, PhD(c) – Research Fellow, UW Department of Global Health)</i> “Addressing the Road Safety Implementation Gap in Ghana: A Focus on Road User Perspectives”	Page 2
Hannah C. Cockrell, MD – UW PROGRESS Research Fellow “Equity in Geographic Access to Optimal Pediatric Surgical Care in The United States”	Page 3
Mary A. Hunter, MD, MA, MS, Burn/Surgical Critical Care Fellow “Evaluation of Promis-10 Global Health Survey Implementation at a Regional Burn Center Clinic”	Page 4
Alison S. Bae, MD – Plastic Surgery R6 “Lymphatic Microsurgical Preventive Healing Approach (Lympha) for the Prevention Of Lymphedema, a Single Institution Retrospective Review”	Page 5
Kyle S. Bilodeau, MD – T32 NIH-NIGMS Institutional Postdoctoral Research Fellow in Trauma, Injury and Inflammation “Extracorporeal Cardiopulmonary Resuscitation for Children Who Experience Out-Of-Hospital Cardiac Arrest”	Page 6
Sarah K. Brennan, BS – Medical Student “Risk of Lymphedema in a Contemporary Cohort of Breast Cancer Patients After Axillary Dissection: A Single Institution Retrospective Review”	Page 7
Kate E. McNevin, MD – General Surgery R4 “Validation of the Pcpic Database Using Nsqip-P: A Patient Matched Comparison of Surgical Complications Following Repair of Anorectal Malformations”	Page 8
Arjune S. Dhanekula, MD – Cardiothoracic Surgery R4 “Cause-Specific Morbidity and Mortality in Young Patients Following Mechanical Aortic Valve Replacement”	Page 9

CLOSING REMARKS

ADJOURN

MANAL JMAILEH, MD, MPH

TL1 Translational Research Training Program Research Fellow

RESEARCH INTERESTS: Trauma surgery, injury prevention, global health, and health care capacity

FACULTY MENTORS: Barclay Stewart, MD, PhD, MPH and Charles Mock, MD, PhD, MPH

MEDICAL SCHOOL: University of Washington School of Medicine

HOMETOWN: Tacoma, WA



ADDRESSING THE ROAD SAFETY IMPLEMENTATION GAP IN GHANA: A FOCUS ON ROAD USER PERSPECTIVES

Stewart BT, Wagenaar B, Opoku I, Gyedu A, Mock C, Damsere-Derry J, Mohammed B, Matinu S, Feldacker C

BACKGROUND: The burden of road traffic injuries and deaths is staggering and expected to increase in Ghana and in other low- and middle-income countries. Road users are often neglected in policymaking, leading to widespread dissatisfaction with existing interventions and communities addressing road safety issues themselves (i.e., by building their own unauthorized speed calming measures). The objective of this study is to explore road user perspectives on the causes and solutions to crashes, injuries, and deaths in high-risk areas.

METHODS: We conducted in-depth interviews with road users in areas of high crashes, injuries, and deaths on national roads in Ghana. We purposively selected two types of road users: vulnerable road users, defined as not having external protection (e.g., a pedestrian, motorcyclist) and non-vulnerable users, defined as having external protection (e.g., a motorist, passenger). We used a mixed deductive (direct content analysis) and inductive (interpretive phenomenological analysis) approach to analyze findings.

RESULTS: We conducted a total of 22 in-depth interviews with 12 vulnerable road users and 10 non-vulnerable road users in two urban hot spot locations in Greater Accra Region and two rural hot spot locations in the Northern Region. Factors reported to cause crashes, injuries, and deaths included environmental factors such as a lack of sidewalks and nighttime lights, human factors such as illegal pedestrian crossings and excessive speeding, and vehicle factors such as brake failures and limited safety features (e.g., seatbelts). We found that ambulance services are rarely used due to misconceptions about the arrival time and financial cost. Potential solutions reported included increased enforcement of road safety laws, improved road conditions, and regulation of commercial and public transportation vehicles.

CONCLUSION: This is the first study of its kind to provide evidence on population needs related to road safety in Ghana, which can guide implementation and policymaking.



HANNAH C. COCKRELL, MD

UW PROGRESS Research Fellow

RESEARCH INTERESTS: Health equity, pediatric surgery, environmental sustainability

FACULTY MENTOR: Sarah Greenberg, MD, MPH, FACS

MEDICAL SCHOOL: Virginia Commonwealth School of Medicine

HOMETOWN: Richmond, VA

EQUITY IN GEOGRAPHIC ACCESS TO OPTIMAL PEDIATRIC SURGICAL CARE IN THE UNITED STATES

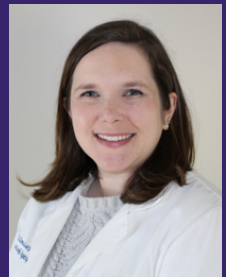
Cockrell HC, Bowder A, Dick A, Linden A, Greenberg SLM

BACKGROUND: We evaluated equity in geographic access to optimal pediatric surgical care in the United States (US) by comparing the location of children's hospitals to the populations they serve.

METHODS: Geographic access to optimal pediatric surgical care was determined by the percent US population within a 2-hour driving distance from an American College of Surgeons (ACS) Children's Surgery Verification Quality Improvement Program Level I Children's Surgery Center (n = 42). A subgroup analysis was done using ACS National Surgical Quality Improvement Program (NSQIP-Peds) participating hospitals (n =127). Percent population within 2-hours was calculated using haversine modeling in ArcGIS Pro (Version 2.9). County-level population density and rural-urban analyses were performed. Results were stratified by race, ethnicity and language.

RESULTS: Most ACS Level I Verified Children's Surgery Centers (73.81%) and NSQIP-Peds hospitals (56.69%) are in large metropolitan areas, where only 30.81% of the US population resides. 62% of the US population lives within 2-hours from an ACS Level I Verified Children's Surgery Center and 89% within 2-hours of a NSQIP-Peds hospital. The majority within 2-hours of an ACS Level I Verified Children's Surgery Center are in the Mid-Atlantic (10.91%), East North Central (11.96%) and South Atlantic (21.60%) US Census Divisions. 60.85% of non-Hispanic whites live within 2-hours of an ACS Level I Verified Children's Surgery Center, compared to 58.93% of Hispanics, 45.88% of Native Hawaiians/Other Pacific Islanders, and 34.46% of American Indians/Alaska Natives. Linguistic minority status did not correlate with geographic difference in access to ACS Level I Verified Children's Surgery Centers.

CONCLUSION: The majority of ACS Level I Verified Children's Surgery Centers and NSQIP-Peds hospitals are within urban areas, which may present geographic barriers to children in rural communities. Burden of miles traveled falls disproportionately on minoritized racial and ethnic groups. Efforts to improve equity in geographic access to optimal pediatric surgical care are needed.



EVALUATION OF PROMIS-10 GLOBAL HEALTH SURVEY IMPLEMENTATION AT A REGIONAL BURN CENTER CLINIC

Hunter MA, Gaskins D, Hubbard MM, Wiechman S, Chambers M, Carrougher G, Gibran NS, Stewart BT

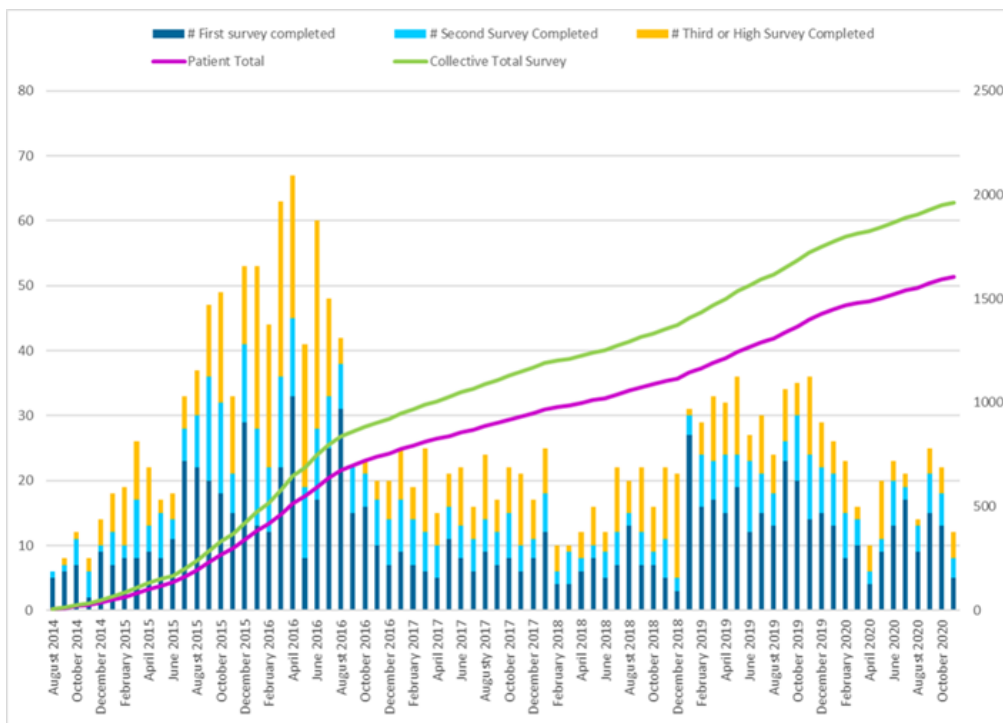
BACKGROUND: Patient-Reported Outcomes Measure System-10 (PROMIS-10) is a survey that evaluates patients’ global physical and mental health. PROMIS-10 was introduced into our burn clinic as a screening tool and serial measure of recovery. We aimed to assess the implementation of PROMIS-10 to improve its equitable use in outpatient clinics.

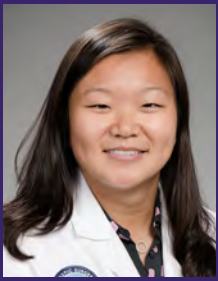
METHODS: The PROMIS-10 was implemented in 2014. The burn clinic staff were trained in its use. Patients were offered English-language surveys at each of their burn clinic appointments. Survey results were reviewed by clinic providers and addressed as part of routine care. Survey answers were entered into REDCap and merged with demographic and burn injury information. Data were collected and analyzed using univariate and bivariable statistics to evaluate equitable implementation.

RESULTS: A total of 1,963 surveys were collected from 1,606 patients from January 2014 to December 2020 (Figure 1). After excluding patients with missing collection of survey and/or demographic data, our analysis included 1,072 patients. The mean number of surveys completed per visit was 0.53 (SEM=0.007) and 88% of patients completed 1 or more surveys. Patients who required intensive care during their index hospitalization or had an operation had higher mean surveys completed per visit (Highest Level of Care ICU=0.611 ± 0.02; Required an operation = 0.608 ± 0.015), whereas patients requiring an interpreter had lower mean surveys completed per visit (Required an Interpreter = 0.468 ± 0.031).

CONCLUSION: Although most patients completed the PROMIS-10 during at least one clinic visit, there is room for improvement to use it as a metric of recovery progress over time. Focus on equity in completion is needed (e.g., coordinating interpreter-assisted completion, availability of translated forms, person-assisted completion for limited English proficiency). Patients with high burn severity had higher rates of survey completion per visit. This is a population in which serial evaluation is helpful in monitoring recovery.

Figure 1: Volume of PROMIS-10 Surveys Completed by Patients at Regional Burn Center Clinic 2014-2020





ALISON S. BAE, MD

Plastic Surgery R6

RESEARCH INTERESTS: Microsurgery, lymphedema

FACULTY MENTOR: Suzanne Inchauste, MD

MEDICAL SCHOOL: Perelman School of Medicine

LYMPHATIC MICROSURGICAL PREVENTIVE HEALING APPROACH (LYMPHA) FOR THE PREVENTION OF LYMPHEDEMA, A SINGLE INSTITUTION RETROSPECTIVE REVIEW

Do M, BA, Song P, MD, Bae AS, MD, Taslakian E, MD, Goldsberry-Long, SR MD, Inchauste SM, MD

BACKGROUND: Secondary lymphedema is estimated in up to 49% of patients after axillary lymph node dissection (ALND) and radiation for breast cancer treatment.¹⁻⁴ Lymphatic microsurgical preventative healing approach (LYMPHA) was first described in 2009⁵ as a method of immediate lymphatic reconstruction to reduce the risk of lymphedema.⁶ Lymphedema incidence following LYMPHA was as low as 2.1% in a recent systematic review.⁸ Our objectives were to identify the rate of lymphedema and potential risk factors in patients who underwent LYMPHA.

METHODS: Retrospective review was performed on patients who underwent LYMPHA from August, 2018 through February, 2022 at a single institution. All patients had node positive breast cancer or recurrence requiring axillary lymph node dissection with a minimum of 3 months follow-up.

RESULTS: A total of 122 limbs successfully underwent LYMPHA over the study period. Rate of lymphedema was 10% (12 of 113) measured by presence of signs and symptoms of lymphedema and L-Dex measurement >10 . Patients with ALND alone compared to those with sentinel node biopsy prior to ALND had an odds ratio, 2.93; $p = 0.096$. Patients with one lymphovenous bypass compared to those with 2 or more had an odds ratio, 3.02; $p = 0.168$. The ratio of lymphatic channels to vein per anastomosis (1:1 vs $\geq 2:1$) was evaluated with an odds ratio 0.36, $p = 0.115$. Patients with adjuvant radiation therapy had odds ratio, 3.49; $p = 0.396$.

CONCLUSION: LYMPHA is a safe approach which has demonstrated clear benefits in prevention of secondary lymphedema following ALND with an incidence of 10% at our institution. Our study shows that several factors including number of lymphovenous bypasses, ratio of lymphatic channels to vein per anastomosis, and adjuvant radiation therapy may influence risk of lymphedema development but none were statistically significant. Longer follow up is needed.

References

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EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION FOR CHILDREN WHO EXPERIENCE OUT-OF-HOSPITAL CARDIAC ARREST

Bilodeau KS, Gray KE, McMullan DM

BACKGROUND: Extracorporeal cardiopulmonary resuscitation (ECPR) improves survival in adult patients with cardiac arrest refractory to conventional cardiopulmonary resuscitation (CPR); however, the impact of ECPR on pediatric patients who are brought into an emergency department (ED) has yet to be elucidated. We sought to evaluate the association of cardiac arrest and ECPR cannulation location on outcomes of pediatric patients with refractory out-of-hospital cardiac arrest (OHCA).

METHODS: A retrospective analysis of the Extracorporeal Life Support Organization (ELSO) registry data was performed. All pediatric patients (age > 28 days to < 18 years) who received ECPR for refractory cardiac arrest in the ED or prior to hospital arrival between 2010 and 2019 were included. We examined associations of location of cardiac arrest and ECPR cannulation (ED vs. non-ED) with outcomes, utilizing unadjusted and multivariate logistic regression for mortality and negative binomial regression for counts of complications across standardized ELSO-defined complication categories.

RESULTS: A total of 140 pediatric patients were identified and included in analyses. Overall survival was 31%. In unadjusted analyses, cardiac arrest prior to index hospital arrival was associated with 2.8 greater odds of mortality (95% CI 1.32, 6.12). Patients who were cannulated outside of the ED experienced 2.4 greater odds of mortality (95% CI 1.12, 4.97). After adjusting for age, race, and diagnoses, these associations were strengthened slightly (prehospital vs. ED cardiac arrest: odds ratio [OR] 3.9, 95% CI 1.61, 9.81; ED vs. non-ED cannulation: OR 2.7, 95% CI 1.19, 6.03). There was no statistically significant association between complications and location of cardiac arrest (incident rate ratio [IRR] 0.93, 95% CI 0.72, 1.18) or ECPR cannulation location (IRR 0.93, 95% CI 0.72, 1.19).

CONCLUSIONS: Location of cardiac arrest and ECPR cannulation influence survival in pediatric patients. Additional studies are needed to identify pre-cannulation predictors of survival.



SARAH K. BRENNAN, BS

Medical Student

RESEARCH INTERESTS: Breast surgery, microsurgery, reconstructive plastic surgery

FACULTY MENTOR: Meghan Flanagan, MD, MPH, FACS

MEDICAL SCHOOL: University of Washington School of Medicine

RISK OF LYMPHEDEMA IN A CONTEMPORARY COHORT OF BREAST CANCER PATIENTS AFTER AXILLARY DISSECTION

Brennan SB, Goldsberry-Long SR, Anderson BO, Byrd DR, Javid SH, Perrin AL, DeStefano L, Palmquist E, Louie O, Neligan P, Wang D, Stein IC, Harlow L, Calhoun KE, Inchauste SM, Flanagan MR

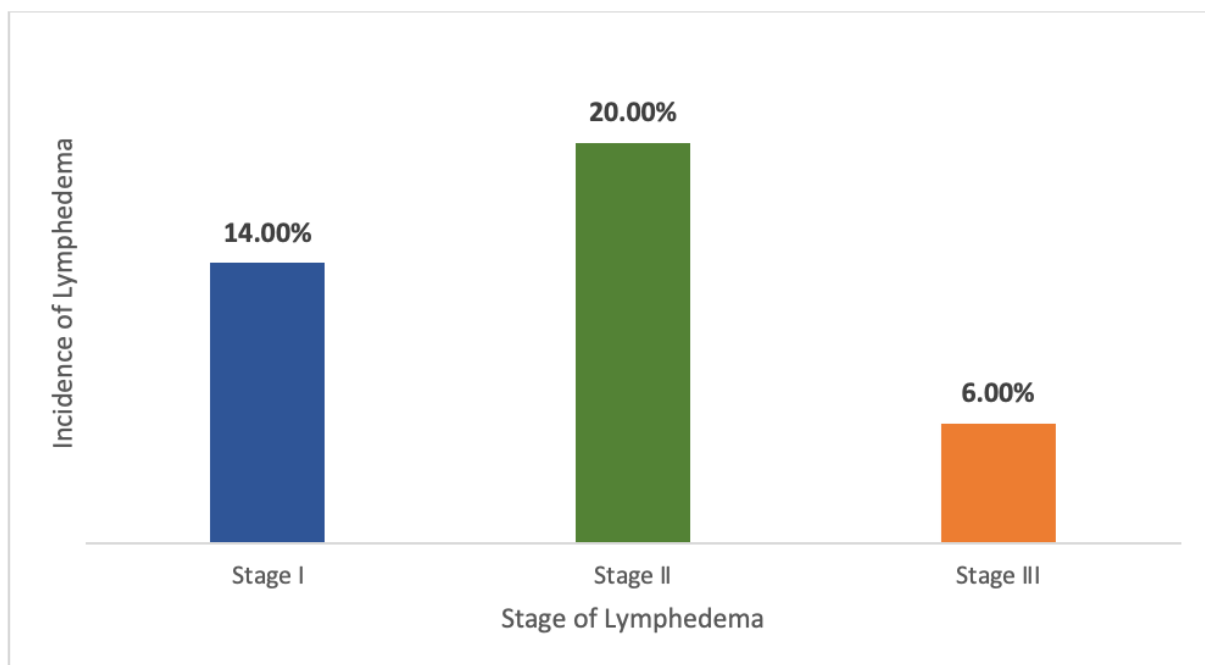
BACKGROUND: Secondary lymphedema has been reported in 16-40% of patients with breast cancer undergoing axillary lymph node dissection (ALND). Increasing use of radiation therapy, preventive surgical procedures, and the implementation of multidisciplinary lymphedema programs aimed at early intervention may impact the longevity of this data. Furthermore, contemporary data regarding the severity of secondary lymphedema is ill-defined.

METHODS: Breast cancer patients who underwent ALND at a single institution between 2018 and 2020 were followed for the development of lymphedema. Lymphedema was defined as an increase of 10 points on noninvasive bioimpedance spectroscopy or 10% increase in arm measurements *and* signs/symptoms of lymphedema. The frequency and stage of lymphedema were calculated, and demographic, tumor and treatment characteristics were evaluated for associations with lymphedema.

RESULTS: ALND was performed in 219 axillae of 217 patients, 178 (82%) of whom were followed for a mean of 30.6 months. The median age at diagnosis was 52 (26 to 87), and the majority were white (78%), postmenopausal (53%) with mean BMI 28.4. Most received chemotherapy (75%) and radiation (86%). Almost 40% (86/217) of patients developed at least stage I lymphedema, with the majority diagnosed at stage II (Figure). On univariate analysis, there were no associations between lymphedema and age of diagnosis, number of nodes removed, year of surgery, race, insurance status, BMI, tobacco use, menopause status, cancer stage, grade, hormone receptors, or receipt of preventive lymphatic surgery or chemotherapy. On multivariable analysis, lymphedema was 2.5-fold greater among those who received radiation compared to those who did not (95% CI 0.99, 6.19 $p = 0.05$).

CONCLUSION: Despite being higher risk than historical controls, the frequency of clinically significant lymphedema (stage II and III) remained comparable, which is likely influenced by early interventions and increased lymphedema awareness.

Figure: Proportion of patients with lymphedema according to stage after ALND for breast cancer.





VALIDATION OF THE PCPLC DATABASE USING NSQIP-P: A PATIENT MATCHED COMPARISON OF SURGICAL COMPLICATIONS FOLLOWING REPAIR OF ANORECTAL MALFORMATIONS

McNevin, KE¹, Nicassio, L¹, Rice-Townsend, SE¹, Glazer, D¹, Katz, CB¹, Goldin, A¹, Avansino, J¹, Calkins, CM², Durham, MM³, Page, K⁴, Ralls MW⁵, Reeder, RW⁴, Rentea, RM⁶, Rollins, MD⁷, Saadai, P⁸, Wood, RJ⁹, van Leeuwen, KD¹⁰, Smith, CA¹

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⁷Department of Surgery, Primary Children's Hospital, University of Utah, Salt Lake City, UT, USA

⁸Department of Surgery, UC Davis Children's Hospital, University of California Davis, Davis, CA, USA

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BACKGROUND: Congenital pediatric colorectal diseases are rare and heterogeneous in nature making this group of patients particularly challenging to study. The Pediatric Colorectal and Pelvic Learning Consortium (PCPLC) aims to improve the health and quality of life of children affected by colorectal conditions. It includes 17 children's hospitals with a registry of more than 3800 patients. PCPLC sites identify patients and upload specific data variables to a national registry. To date, there has been no external validation of the data entered into the PCPLC registry. We sought to validate the data within the PCPLC registry by performing a patient matched analysis of 30-day outcomes with The American College of Surgeons National Surgical Quality Improvement Program-Pediatric (NSQIP-P) database for patients undergoing surgical repair of anorectal malformation (ARM).

METHODS: After approval from the IRB, all patients captured in the PCPLC database at institutions also participating in NSQIP-P who underwent ARM repair younger than 12 months of age were reviewed for 30-day complications. These patients were matched to their NSQIP-P record via retrospective pairing with their hospital identification number. Complications within 30 days of the primary surgical procedure were compared.

RESULTS: There were 591 patients identified in the PCPLC database that met criteria for inclusion. Of these patients, 180 were also included in the NSQIP-P registry. Complications in both the PCPLC database and NSQIP-P database were 7.8% and 10.0% respectively. Complications recorded in both databases demonstrated relative concordance.

CONCLUSION: The 30-day complication rate captured within the PCPLC registry for patients younger than 12 months undergoing surgical repair of ARM appears to have relative concordance with a matched NSQIP-P patient population when accounting for complications not tracked by the PCPLC and normal margin of error. Future studies are needed to externally validate the registry for other patient populations.



ARJUNE S. DHANEKULA, MD

Cardiothoracic Surgery R4

RESEARCH INTERESTS: Aging biology in the aorta, aortic surgical outcomes

FACULTY MENTOR: Christopher Burke, MD

MEDICAL SCHOOL: Wayne State School of Medicine

HOMETOWN: Detroit, MI

CAUSE-SPECIFIC MORBIDITY AND MORTALITY IN YOUNG PATIENTS FOLLOWING MECHANICAL AORTIC VALVE REPLACEMENT

DhaneKula AS, DeRoo SC, Flodin R, Stephens KS, Shird S, DeGraff D, McCray D, Volk J, Burke CR

BACKGROUND: Mechanical aortic valve replacement (mAVR) continues to be standard in young patients due to known durability. However, mAVR has been associated with excess mortality when compared to the general population. The goal of this study is to further understand what influences mortality following mAVR placement.

METHODS: Patients less than 65 years of age who underwent mAVR at a single academic health care system from 2000-2022 were queried for inclusion. Exclusion criteria included emergent procedures, root replacement, and loss to follow-up or death within one year of surgery. Final cohort size was 222 patients. Early peri-operative and long-term outcomes were abstracted from the electronic medical record.

RESULTS: Average age was 53.5 years at the time of surgery. Over the study period, 26 (11.8%) of patients suffered major hemorrhage, 7 (3.2%) had an intracranial bleed, 18 (8.2%) suffered a GI/abdominal bleed, 10 (4.5%) had an intracranial embolic event, and 10 (4.5%) required re-intervention on their aortic valve. 40 patients (18.0%) were confirmed dead, of which 50% were related to cardiovascular causes (Figure 1). Overall survival at 5, 10, and 15 years was 92%, 85%, and 71%, respectively. Survival was not influenced by valve size (p=0.2) or age of patient at the time of mAVR placement (p=0.4). Non-survivors were more likely to be smokers, have a trileaflet aortic valve, carry a diagnosis of heart failure, and have a higher rate of long-term hemorrhagic events (p<0.05). Factors associated with long-term mortality after mAVR included heart failure (p<0.01), presence of a native trileaflet aortic valve (p<0.05), and long-term major hemorrhagic events (p<0.05).

CONCLUSION: Nearly half of young patients with an mAVR experience death, reintervention, or a major hemorrhagic event within 15 years following mAVR placement; further, most of these deaths are cardiovascular related. Anticoagulation-related hemorrhagic events seem to be a primary driver for this observed excess mortality, and further research is needed to explore ways to mitigate this impact.

Figure 1. Cause-of-death breakdown amongst patients who received a mechanical AVR under the age of 65. 50% of deaths were due to cardiovascular causes.

